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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/CA2004/000969

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-11 as originally filed

Claims, Numbers

2, 4-6, 8-10, 14-16, 18-24 as originally filed
1, 3, 7, 11-13, 17 received on 21.09.2005 with letter of 14.09.2005

Drawings, Sheets

1/14-14/14 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):
4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4,5,7-10,14,15,17-24
	No: Claims	1-3,6,11-13,16
Inventive step (IS)	Yes: Claims	
	No: Claims	1-24
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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Reference is made to the following documents:

D1: GB-A-2 208 556 (LINOTYPE LIMITED) 5 April 1989 (1989-04-05)
D2: US-A-4 680 710 (KIZILBASH) 14 July 1987 (1987-07-14)
D3: US-A-5 416 898 (OPSTAD ET AL.) 16 May 1995 (1995-05-16)
D4: US-B1-6 288 726 (BALLARD) 11 September 2001 (2001-09-11)

1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 11 is not new in the sense of Article 33(2) PCT.

1.1 The document D1 discloses (the references in parentheses applying to this document):

a method for processing a data string ("sequence of character signals", page 3 line 15) of Arabic ("Nastaliq", "Urdu", page 1 line 3) text characters into Arabic calligraphic script representation data ("conjoined letters, page 3 line 20), the method comprising:

providing a set of predetermined glyphs, each of said glyphs being a character having a form selected from a set of forms ("each letter may have a different shape or character depending on its position in a word", page 8, lines 7-14), each of said forms having a type selected from a set of types ("shapes", page 8 line 19 & page 9, lines 7-12), each of said glyphs having been written by a calligrapher (implicit: it is reasonable to assume, in the context of a calligraphic font method, that the glyphs of the font were produced by digitising (see D1, page 3, line 18 & 19) character shapes drawn by a calligrapher) and stored in a font table ("font store", page 3 line 11-12)

identifying words in said string (page 10, lines 13-19)

identifying a form of said characters in said words, said form comprising initial, medial, final and isolated (page 8, lines 7-11; page 10 line 20 - page 11 line 8)

for said characters that are not of said final form (implicit), identifying a type of said characters as a function of compatibility with a type of a neighbouring character (page 10 line 20 - page 11 line 8) wherein said type is determined by a left attribute and a

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right attribute (see page 4, lines 9-21, where the character shape is influenced by the preceding character AND a character may also influence the shape of ITS preceding character) selected from a set of attributes in order to match a type of an adjacent glyph, said compatibility being determined by pen and hand movement of said calligrapher (see page 1, lines 15-16; clearly the shape and thickness of a character are functions of pen & hand movement of the calligrapher who drew it, and as has been stated above it is implicit that, in a method that aims to simulate calligraphic writing, the glyphs used are digitised representations of a calligrapher's work)

selecting for each one of said characters in said data string a glyph from a set of predetermined glyphs corresponding to said characters, said form and said type (page 10 line 20 - page 11 line 8)

determining a vertical offset ("base jump value") for each glyph to match neighbouring glyphs (page 11 line 9 - page 12 line 7) said script representation data comprising glyph identification data and offset data for each character in the string (implicit).

This method is also summarized quite nicely on page 15 line 23 - page 16 line 14 of D1

- 1.2 All the features of the method of claim 1 are known from D1, and it thus follows that the subject matter of claim 1 does not fulfil the requirements of Article 22(1) and 33(2) PCT with regard to novelty.
- 1.3 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 11, which therefore is also considered not new.
- 1.4 Documents D2 and D3 are also considered novelty-destroying for claims 1 and 11.
- 2 Dependent claims 2-10 and 12-24 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

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- 2.1 The subject matter of claims 2,3,12 and 13 is known from D1 (see page 1 lines 10-16 and represents, in any case, obvious requirements for computerised Arabic calligraphy.
- 2.2 The subject matter of claims 4, 5, 14 and 15 is discussed in D4 (see column 2 lines 1-35) and is in any case not supported by the description (Article 6 PCT).
- 2.3 Handling of diacritics (claims 6 and 16) is known from D1 (page 16 line 19 - page 22 line 23). Preventing invalid combinations of characters and diacritics (claims 7 and 17) is obvious to the skilled person.
- 2.4 Ligatures (claims 8-10, 18 and 19) are an implicit part of any calligraphic system and are discussed explicitly in documents D2-D4.
- 2.5 The incorporation of the Arabic string processing apparatus of claims 11-19 into a printing device (claim 20) is suggested by D1, is in any case obvious and would not result in any unexpected effects. Input/output modules (claim 21) are conventional features of computerised equipment in general. Image/text translators (defined in the present description - see page 11 - as being, for example, page definition language compilers) are well known in the art, so claim 22 is not inventive either.
- 2.6 The incorporation of the Arabic string processing apparatus of claims 11-19 into a "user device" (claim 23) or a web browser (claim 24) is obvious to the skilled person given the task of enabling said user device or said web browser to faithfully render Arabic calligraphy and would not result in any unexpected effects. It is therefore not inventive.

WHAT IS CLAIMED IS:

1. A method for processing a data string of Arabic text characters into Arabic calligraphic script representation data, the method comprising:

providing a set of predetermined glyphs, each of said glyphs being a character having a form selected from a set of forms, each of said forms having a type selected from a set of types, each of said glyphs having been written by a calligrapher and stored in a font table;

identifying words in said string;

identifying a form of said characters in said words, said set of forms comprising initial, medial, final and isolated;

for said characters that are not of said isolated form, identifying a type of said characters as a function of compatibility with a type of a neighboring character, wherein said type is determined by a left attribute and a right attribute of said character, selected from a set of attributes in order to match a type of an adjacent glyph, said compatibility being determined by pen and hand movement of said calligrapher;

selecting, for each one of said characters in said data string, a glyph from said set of predetermined glyphs corresponding to said character, said form and said type; and

determining a vertical offset for each of said glyph to match neighboring glyphs, said script representation data comprising glyph identification data and offset data for each character in said data string.

2. The method as claimed in claim 1, wherein said type identified is a best match of attributes between glyphs available in said set of glyphs for said form of said characters, said best match corresponding to a visualization of a calligrapher.

3. The method as claimed in claim 2, wherein said set of attributes comprises thickness, pen movement direction, pen rotation direction, and waveform.

4. The method as claimed in any one of claims 1 to 3, wherein said set of glyphs comprises 512 glyphs or fewer.

5. The method as claimed in any one of claims 1 to 3, wherein said set of glyphs comprises 256 glyphs or fewer.

6. The method as claimed in any one of claims 1 to 5, wherein diacritics are represented by separate characters in said string corresponding to separate glyphs in said set of predetermined glyphs, said selecting comprising determining an offset position of each diacritic to be associated with a glyph representing a letter.

7. The method as claimed in claim 6, wherein unacceptable combinations of diacritics are verified and disallowed.

8. The method as claimed in any one of claims 1 to 7, wherein some of said glyphs represent ligatures.

9. The method as claimed in claim 8, wherein said ligatures represent ligatures joining two letters.

10. The method as claimed in claim 8, wherein said ligatures represent ligatures joining a letter and at least one diacritic.

11. An apparatus for processing a data string of Arabic text characters output from an Arabic text source into Arabic calligraphic script representation data, the apparatus comprising:

 a storage module comprising a set of predetermined glyphs, each of said glyphs being a character having a form selected from a set of forms, each of said forms having a type selected from a set of types, each of said glyphs having been written by a calligrapher and stored in a font table in said storage module;

 a word identification module receiving said data string and outputting a word;

 a form identification module receiving said word and outputting a form of said characters in said word, said form being selected from a set of forms

comprising initial, medial, final, and isolated;

a type identification module receiving said form and said characters and outputting type data of said characters as a function of compatibility with a type of a neighboring character, wherein said type is determined by a left attribute and a right attribute of said character, selected from a set of attributes in order to match a type of an adjacent glyph, said compatibility being determined by pen and hand movement of said calligrapher;

a glyph identification module receiving said type data and said characters and selecting, for each one of said characters, a glyph from said set of predetermined glyphs corresponding to said characters, said form, and said type; and

an offset determining module receiving said glyph and said characters and determining a vertical offset for said glyph to match neighboring glyphs and outputting said calligraphic script representation data.

12. An apparatus as claimed in claim 11, wherein said type identification module identifies a best match of attributes between glyphs available in said set of predetermined glyphs for a form of a character, said best match corresponding to a visualization of a calligrapher.

13. An apparatus as claimed in claim 12, wherein said set of attributes comprises thickness, pen movement direction, pen rotation direction, and waveform.

14. An apparatus as claimed in any one of claims 11 to 13, wherein said set of glyphs comprises 512 glyphs or fewer.

15. An apparatus as claimed in any one of claims 11 to 13, wherein said set of glyphs comprises 256 glyphs or fewer.

16. An apparatus as claimed in any one of claims 11 to 15, wherein said word identification module identifies diacritics as separate characters in said string, said glyph identification module associates said diacritics to separate glyphs in said set

of predetermined glyphs, and said offset determining module determines an offset position of each diacritic to be associated with a glyph representing a letter.

17. An apparatus as claimed in claim 16, wherein said word identification module verifies unacceptable combinations of diacritics and disallows them.

18. An apparatus as claimed in any one of claims 11 to 17, wherein some of said glyphs in said predetermined set of glyphs represent ligatures.

19. An apparatus as claimed in claim 18, wherein said ligatures represent ligatures joining two letters.

20. An electronic printing apparatus comprising an apparatus for processing a data string of Arabic text characters output from an Arabic text source into Arabic calligraphic script representation data, said apparatus for processing defined as per any one of claims 11 to 19.

21. An electronic printing apparatus as claimed in claim 20, wherein said electronic printing apparatus comprises an input/output module, and said apparatus for processing inputs said calligraphic script representation data into said input/output module.

22. An electronic printing apparatus as claimed in claim 20, wherein said electronic printing apparatus comprises an image/text translator, and said apparatus for processing inputs said calligraphic script representation data into said image/text translator.

23. A user device having an application and a printer device driver and comprising an apparatus for processing a data string of Arabic text characters output from an Arabic text source into Arabic calligraphic script representation data, said apparatus for processing defined as per any one of claims 11 to 19.

24. A web-browser comprising a translator that takes standard text in HTML

and converts it onscreen, characterized in that the translator comprises an apparatus for processing a data string of Arabic text characters output from an Arabic text source into Arabic calligraphic script representation data, said apparatus for processing defined as per any one of claims 11 to 19.